

**REMARKS**

Applicants have now revised the application in consideration of the Examiner's comments and observations set forth in the Office Action of September 4, 2002 and the Advisory Action of November 13, 2002. Reexamination and reconsideration are respectfully requested.

**The Office Action**

Claims 1-18 were presented for examination.

Applicants gratefully acknowledge the Examiner's indication as to the allowance of claims 6-8 and 11-14, as well as the allowable subject matter in claims 9, 10, 15, 17 and 18.

Claims 1-5 and 16 stand rejected as being anticipated by Dhuler et al. (U.S. Patent No. 5,962,949).

**The Claims Distinguish Over the Cited Art**

In rejecting claim 1, layers 52 and 54 of Dhuler et al. are recited as being equivalent to the "ribbon hinge structure" of independent claim 1. Thereafter, heater 56 is recited as being equivalent to the "electrical conductor" (now amended to "electrical conductor material"), of claim 1.

In Applicants' previous response, the reason for the configuration of layers 52, 54 and heater 56 as described in Dhuler et al were summarized.

From the comments in the Office Action, it appears Applicants' previous comments were interpreted as being a discussion directed to the intended use of the claimed subject matter. However, the discussion provided in the previous Office Action was intended to particularly point out structural distinctions between the claimed invention and Dhuler et al. Applicants' reference to the operation of Dhuler et al. versus the operation of the present application was provided to emphasize that they operate differently due to the structural distinctions.

Specifically, as recited on page 9 of the previous response:

Thus, the concept of Dhuler et al. as cited by the Office Action is to sandwich the heater 56 between two deformable layers. The heater is then provided with energy which causes expansion at varying rates permitting movement of the

actuator 50. On the other hand, the electrical conductor of the present application is defined as being **carried on at least a portion of a surface of the ribbon hinge structure.**

The structural language from claim 1 is highlighted in bold.

The response then continues to recite that the electrical conductor material of claim 1 is not sandwiched between two layers as specifically disclosed in Dhuler et al. The reference to the intended manner of operation is again set forth to emphasize the structural difference recited in the claim as compared to Dhuler et al. To more clearly state Applicants' position; if the ribbon structure of the present claim 1 is analogized to layer 52 and 54 of Dhuler et al, and the conductor is heater 56, the structure shown in Dhuler et al., has the "electrical conductor" (*i.e.*, heater 56) embedded within the ribbon hinge structure (*i.e.*, layer 52 and 54). It is not, as recited in claim 1, "carried on at least a portion of a surface of the ribbon hinge structure."

If in an attempt to analogize Dhuler et al. to the structure claimed in claim 1, the heater 56 is placed on a surface of the ribbon structure, then the intent of Dhuler et al. is destroyed. This is true, since heater 56 is needed to be embedded to cause the bending operation.

Therefore, and again, it is respectfully submitted independent claim 1 is not taught or fairly considered by Dhuler et al. While claim 1 would cover a situation where a third party places a cover over the surface of the conductor, this is distinct from the Dhuler et al. reference. In Dhuler et al., the heater needs to be imbedded with the layer to function.

Turning attention to dependent claim 3, it is argued, in the Office Action, that the ability of movement in the X, Y and especially Z positions, notes a device's ability for "twisting mechanical torque." Applicants respectfully submit there is no language in Dhuler et al. to support this position. More particularly, as stated in the previous response, movement in the X and Y position occurs in a single plane. Movement in the z direction is a forward and back movement, but does not imply, teach or suggest a "side twisting mechanical torque" as recited in claim 3. There is no teaching or suggestion in Dhuler et al. that movement in these directions are combined in some manner to provide a twisting action. Therefore, Applicants respectfully submits the Office Action has inappropriately read in a function which is not taught or fairly suggest d by the cited art.

It is also noted that even if the Examiner was of the position that a "twisting mechanical torque" existed, Dhuler has no teaching or suggestion of a twisting effect of the ribbon hinge structure to 90° or more from an initial 0° twisted position; it is submitted this is an additional distinguishing feature. Thus, even if it is maintained that somehow a twisting action exists, from the operation and the description set forth in Dhuler et al., there is no suggestion that any twisting action could achieve anywhere near a 90° or more position. For this reason, it is respectfully submitted the language of claim 3 is not taught or fairly considered.

With attention to the rejection of claim 5, Applicants have reviewed Figure 4 and do not see an isolation region formed with the ribbon structure, and within which is deposited the electrical conduction material or an area of insulation material which has been deposited and patterned on the ribbon structure, wherein conductors can then be placed on top of the insulation material. In Figure 4, Applicants again view a buried structure within the ribbon hinge. If this rejection is to be maintained, Applicants request the Examiner point to the alleged structure with greater specificity.

**CONCLUSION**

For the reasons detailed above, it is respectfully submitted all claims (claims 1-15, 17 and 18) remaining in the application are now in condition for allowance. An early notice to that effect is therefore earnestly solicited.

To expedite prosecution of this application, should the Examiner find objection to the Applicants description and explanations, Applicants respectfully request a telephone interview to discuss this matter.

Respectfully submitted,  
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Attachment: Version With Markings to Show Changes Made

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**VERSION WITH MARKINGS TO SHOW CHANGES MADE**

Please cancel claim 16.

Please amend claims 1, 5, 9, 10 and 15 as follows:

1. (Twice Amended) A hinge for use in a micro-assembly employing electrical power supplied from an electrical power source, the hinge comprising:

a silicon-on-insulator wafer including a bottom substrate layer, a middle buried oxide layer and a single crystal silicon device layer;

a ribbon hinge structure formed in the device layer of the silicon-on-insulator wafer, wherein the ribbon hinge structure is flexible and capable of movement out of the plane of the device layer; and

an electrical conductor material carried on at least a portion of a surface of the ribbon hinge structure.

5. (Twice Amended) The invention according to claim 1 wherein the ribbon structure has at least one of (i) an isolation region formed within the ribbon structure, and within which is deposited the electrical [conduction] conductor material, or (ii) an area of insulation material which has been deposited and then patterned on the ribbon structure, wherein conductors can then be placed on top of the insulation material.

9. (Amended) The invention according to claim 6 wherein the micro-device includes an isolation region, formed within the micro-device, and in which the electrical [conductive] conductor material is deposited.

10. (Twice Amended) The invention according to claim 6 further including an isolation region formed within the ribbon structure, and within which is deposited the electrical [conductive] conductor material.

15. (Twice Amended) The invention according to claim 6 wherein the ribbon structure is configured with a mechanical integrity which permits application of a lifting out-

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of-plane mechanical torque to lift the [out-of-plane device] micro-device from 0° which is in [the] a horizontal plane, to 90° or more out of the horizontal plane.

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